

# The AMD Opteron™ Processor for High-end Embedded Designs



## Providing a balanced approach to embedded system design

The AMD Opteron™ processor provides a breakthrough in high-performance, low power processing for edge-of-enterprise markets including storage and telecommunications, as well as more traditional embedded markets such as security and medical imaging, military systems, and single-board computing. AMD64 technology with Direct Connect Architecture helps provide a balanced foundation for embedded systems. Based on the industry-standard x86 platform, AMD64 delivers the right match of processing power, memory performance, I/O throughput, and scalability. Add the vision of 32- and 64-bit application support with native multi-core computing in a consistent thermal envelope and many embedded designers are finding their next-generation systems deliver record-breaking application performance.



## What can a leading processor platform offer?

AMD Opteron processors with its third generation Direct Connect Architecture can help improve overall system performance and efficiency by helping eliminate traditional bottlenecks inherent in architectures where traditional front-side buses restrict and interrupt the flow of data. With AMD Opteron processors, there are no front-side buses. Instead, the processors, memory, and I/O are directly connected to the CPU. Further, the integrated memory controller reduces memory latency while HyperTransport™ technology delivers a very high I/O bandwidth. Data speeds through the system without encountering the traditional front-side bus bottleneck of competing x86 platforms. In addition to the architectural benefits inherent in Direct Connect Architecture, the AMD Opteron processor offers the following unique advantages for high-end embedded systems:

- **HyperTransport technology** provides up to 24.0GB/s peak bandwidth per processor
- **On-die integrated DDR2 memory controller** offers available memory bandwidth up to 10.7GB/s (with DDR2-667) per processor
- **Hardware assisted AMD Virtualization™ technology** in AMD Opteron processors with DDR2 helps streamline the efficiency of multiple servers and provides virtual machine memory isolation for improved security
- Upgrade to quad-core AMD Opteron processors when they become available in 2008

## Reliable, scalable

It's a fact that reliability is key in selecting embedded system components. AMD Opteron processors are NEBS-friendly, supporting telecommunications industry requirements for reliability. AMD64 technology provides features like Error Correcting Code (ECC) and JTAG interfaces for effective debug during system development. Additionally, Direct Connect Architecture requires fewer chips on the motherboard, further enhancing a system's overall reliability.

The AMD Opteron processor provides unique scalability options with glueless multi-processing from one socket (2 core) to 8 socket (16 core) systems. This, combined with AMD64's reliability, helps provide an embedded design that can give customers a long-range plan for the life cycle of their systems.

Beyond outstanding processors: Longevity, exceptional design support, quick time to market

The AMD64 Longevity Program is designed so that the high-performance processors you select for an embedded design will be available for a longer than standard time frame. AMD understands the unique requirements of the embedded market and our AMD64 Longevity Program is in place to maximize the available choice of leading edge x86 processors – delivering a wide range of performance, power, thermal, and packaging features.

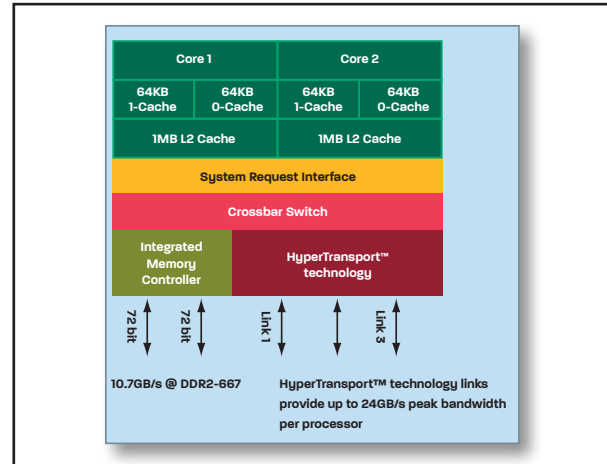
AMD has a strong design support program in place. From Reference Design Kits (RDK) to extensive and readily available documentation to a suite of leading debug tools, our goal is to make your design cycle quick and efficient, and to help you get your embedded products on the market quickly. Add this to the improved time to market achieved with utilizing commercial off-the-shelf products like the industry-standard x86 AMD Opteron processor.

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AMD Opteron™ Processor Model	Peak power (worst case)	Processor, "Front-side Bus"/Integrated Memory Controller Speed*	L2 Cache size	Socket and Core Specification
8214 HE	68W	2.2GHz	1MB/core	Socket F (1207) Dual Core
8210 EE	45W	1.8GHz	1MB/core	Socket F (1207) Dual Core
2214 HE	68W	2.2GHz	1MB/core	Socket F (1207) Dual Core
2210 EE	45W	1.8GHz	1MB/core	Socket F (1207) Dual Core
1214 HE	68W	2.2GHz	1MB/core	Socket F (1207) Dual Core
1210 EE	45W	1.8GHz	1MB/core	Socket F (1207) Dual Core
2208 HE	45W	1.8GHz	512KB/core	Socket F (1207) Dual Core
2204 HE	45W	1.8GHz	512KB/core	Socket F (1207) Single Core

\*With AMD64 Technology, the processor-to-memory controller interface is on the die, allowing memory data to flow at processor speed. In multi-processor systems, each processor has its own memory controller, allowing for scalability without an increase in data bottlenecks.

Block Diagram



## What about performance-per-watt?

It's a growing concern from the data center to embedded systems – how to increase computing performance without incurring excess power draw, additional cooling requirements, or taking up more space in either real estate or form factor. AMD was first to recognize that the processor could offer part of the solution in reducing total cost of ownership.

- **Microprocessor architecture** – AMD64 processor design helps reduce the overall system power budget with integration of the North Bridge, while multi-core processors are designed to offer increased performance, with higher compute density and scalability
- **Low power processors** – AMD provides a, consistent roadmap with a variety of wattage options
- **Low operational costs** – reduced power draw and heat dissipation means lower data center energy costs. Features like AMD PowerNow!™ technology with Optimized Power Management helps deliver performance on demand and minimizes power consumption
- AMD Opteron processors with DDR2 offer a seamless upgrade path to quad-core computing in the same power and thermal envelope

[www.amd.com/embedded](http://www.amd.com/embedded)

## ABOUT AMD

AMD (NYSE:AMD) designs and produces innovative microprocessors and low-power processor solutions for the computer, communications, and consumer electronics industries. AMD is dedicated to delivering standards-based, customer-focused solutions for technology users, ranging from enterprises and governments to individual consumers.

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